REMARKS

The following remarks are made in response to the Non-Final Office Action mailed April 3, 2007. Claims 10-17 were rejected. With this Response, claims 10 and 17 have been amended. Claims 10-14 and 16-17 remain pending in the application and are presented for reconsideration and allowance.

Claim Rejections under 35 U.S.C. § 102

The Examiner rejected claim 10 under 35 U.S.C. § 102(b) as being anticipated by the Anthony et al. U.S. Patent No. 6,172,904. Applicant respectfully disagrees with the Examiner's characterization of the Anthony et al. reference, or that it teaches or suggests the claims.

The Anthony et al. reference describes the embodiment depicted in Figure 3 in column 3, line 62 to column 4, line 18. According to this description, the MRAM memory cell described by the Anthony et al. reference includes:

- two layers 66, 68 of anti-ferromagnetic material having different blocking temperatures;
- two reference layers 54, 50;
- the first reference layer 54 is pinned by the first layer 66 having the first blocking temperature and
- the second reference layer 50 is pinned by the second layer 68 having the second blocking temperature.

Furthermore, the Anthony et al. reference describes in column 3, line 67 to column 4, line 5:

> "the layers 66 and 68 have different blocking temperatures, so that one layer is pinned upon lowering the temperatures through the first blocking temperature and reversing the setting field before the temperature is lowered through the second blocking temperature".

Also, the description in column 3, lines 64 to 67 provides:

> "in this embodiment, the reference layer 54 is pinned by a layer 66 of anti-ferromagnetic material, and the reference layer 50 is pinned by a layer 68 of anti-ferromagnetic material"

From the combination of these two descriptions, it is evident that the description of Anthony et al. reference that "one layer is pinned upon lowering the temperature through the first blocking temperature..." can only mean that "said ***one layer***" (column 4, line 1) refers to the reference layer 54 and not to the layer 68 as alleged by the Examiner in the lower part of page 5 of the Office Action. The layer 68 itself is a layer consisting of anti-ferromagnetic material and can by no means magnetized by anti-ferromagnetic coupling with the layer 66.

Essentially, as depicted by the embodiment in Figure 3 and described in the lower part of column 3 and the upper part of column 4 of the Anthony et al. reference, at first the magnetization of ***both reference layers 50 and 54*** is turned parallel to the direction M3 (cf. Figure 1 of the Anthony et al. reference) starting from a temperature which is above the blocking temperature ***of both layers 66 and 68***. Thereafter, the temperature is lowered below the blocking temperature of the upper layer 66 of anti-ferromagnetic materials, however, held above the blocking temperature of the lower layer 68 of anti-ferromagnetic material. This step effects the development of an anisotropoic magnetizing axis within the reference layer 54 directed in the magnetic field direction M3. Afterwards, the direction of the external magnetic field is turned into the direction M1 (cf. Figure 1 of the Anthony et al. reference) and the temperature is decreased below the blocking temperature of the ***lower layer 68*** of anti-ferromagnetic material. The latter step effects the development of an anisotropic magnetizing within the lower reference layer 50 directed in the direction M1 of the external magnetic field.

To carry out this procedure in the embodiment according to Figure 3 the Anthony et al. reference uses ***two layers 66 and 68 of anti-ferromagnetic material and two reference layers 54 and 50***, wherein the first reference layer 54 is pinned by the first anti-ferromagnetic layer 66 having the first blocking temperature and the second reference layer 50 is pinned by the second anti-ferromagnetic layer 68 having the second (lower) blocking temperature.

As is now more clearly specified, the layer system exclusively consisting of the first layer of a material having a first Curie temperature, the second layer being magnetized by antiferromagnetic coupling ***with only*** the first layer, and a very thin intermediate coupling layer between the first and second layers. Furthermore, the artificial antiferromagnet is exclusively

formed from the first layer, the second layer and the intermediate coupling layer. These unique features are neither taught nor suggested by the art of record.

Therefore, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 102(b) rejection to claim 10, and request allowance of these claims.

Claim Rejections under 35 U.S.C. § 103

The Examiner rejected claims 11-17 under 35 U.S.C. § 103 for being unpatentable over the Anthony et al. U.S. Patent No. 6,172,904. Because these claims depend from claims 10 above, which is now believed to be allowable as detailed above, these claims are also in condition for allowance. Therefore, Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. § 103 rejection to claims 11-14 and 16-17, and request allowance of these claims.

CONCLUSION

In view of the above, Applicant respectfully submits that pending claims 10-14 and 16-17 are in form for allowance and are not taught or suggested by the cited references. Therefore, reconsideration and withdrawal of the rejections and allowance of claims 10-14 and 16-17 are respectfully requested.

No fees are required under 37 C.F.R. 1.16(b)(c). However, if such fees are required, the Patent Office is hereby authorized to charge Deposit Account No. 50-0471.

The Examiner is invited to contact the Applicant's representative at the below-listed telephone numbers to facilitate prosecution of this application.

Any inquiry regarding this Amendment and Response should be directed to Paul P. Kempf at Telephone No. (612) 767-2502, Facsimile No. (612) 573-2005. In addition, all correspondence should continue to be directed to the following address:

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